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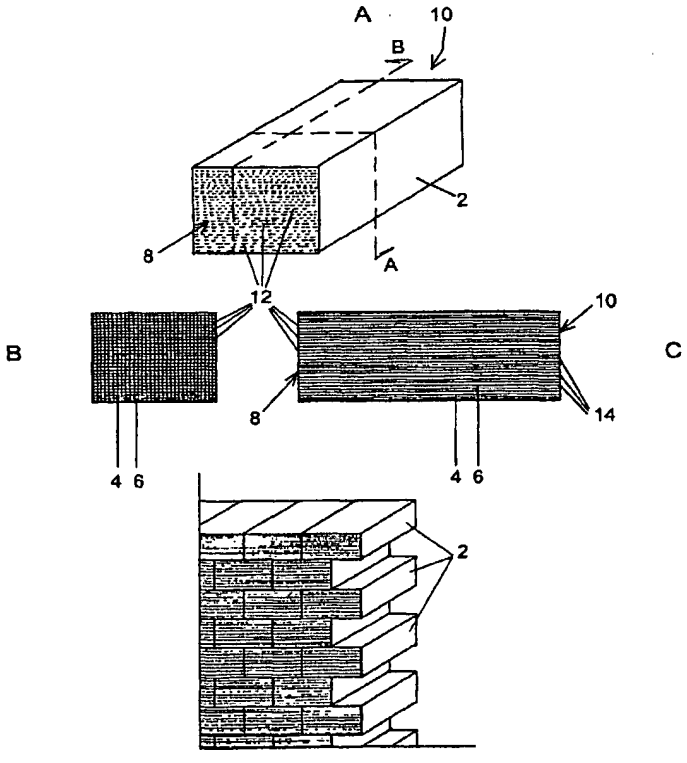
(54) Title: BUILDING BLOCK COMPRISING LIGHT TRANSMITTING FIBRES AND A METHOD FOR PRODUCING THE SAME



(57) Abstract: The present invention relates to a building block (2) comprising embedded light transmitting fibres (6) in a cast material (4), where the fibres are arranged in the cast material from a first lateral surface (8) of the building block to an opposite second lateral surface (10) of the same, whereby a fibre end, respectively, is arranged to end up at a respective position (12) on the first lateral surface (8), and the other end of the fiber is arranged to end up at a respective position (14) on the second lateral surface, whereby the fibres (6), respectively, permits transfer of light through the building block emitted from a light source arranged behind either of the lateral surfaces (8, 10), that the cast material (4) and the embedded fibres (6) therein constitute a building block (2) with a homogeneous structure that can receive load and further that a plurality of fibres (6) are evenly distributed over substantially the whole lateral surface (8, 10), respectively, whereby light can be emitted from the evenly distributed fibre ends in positions (12, 14) over substantially the whole lateral surface. The present invention also relates to a method for producing a building block comprising embedded light transmitting fibres.

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BUILDING BLOCK COMPRISING LIGHT TRANSMITTING FIBRES AND A METHOD FOR PRODUCING THE SAME

Technical area

The present invention relates to a building block comprising light transmitting fibres embedded in a cast material. The present invention also relates to a method for producing a building block comprising embedded light transmitting fibres.

Background

For practical and decorative reasons it is usually frequent that a building block, such as a wall-, floor- or ceiling-surface is illuminated by one or several separate sources of light, e.g. so called spotlights, directed to the surface in question. Nowadays it is also popular to mount lamps in building elements, such that they are recessed and/or flush with the surface, which provide some lighting over the surface and some lighting in adjoining rooms adjacent to the surface.

From GB 1561142 it is previously known to arrange light guiding bars comprising bundles of optical fibres, in drilled through holes between two opposite sides of a building element. Light from a light source that illuminates a rear side of the element is guided through the bars bundles of fibres to the opposite side.

However, it is unpractical, time consuming and costly, as mentioned above, to mount light sources or optical cables in prepared building elements or in built walls, ceilings or floors, in order to transfer light through the building element. Particularly if small light sources, at certain points, shall be mounted in the building element. If a considerable part of a surface shall emit light, it is easily appreciated that the work

will be lengthy since a large number of holes have to be made. Besides, only mounting of a limited number of light sources in the building element can be done by these known methods, if not influencing the strength of the element. In case a light emitting and/or illuminating effect is desired to be provided over a considerable part of a surface, when not a separate light source can or is desired to be used, it is in practice only possible by mounting relatively light-spreading sources in the surface layer of the building element in order to avoid that its strength is not influenced. Thus, formation of the extent of illumination and the decorative effect becomes restricted.

Description of the invention

An object according to the present invention is to eliminate the drawbacks that are associated with the state of the art. Yet an object is to provide prefabricated, load-carrying building elements of traditional elementary material, such as e.g. concrete, and that simultaneously, in itself to certain extent, can let light through over the main part of two of its opposite surfaces and that simultaneously permits an uncomplicated and cost-efficient production.

This object is achieved by a building block comprising embedded light transmitting fibres in a cast material, such as optical fibres or the like, according to the present invention as defined in claim 1, where the fibres are arranged in the cast material from a first lateral surface of the building block to an opposite second lateral surface of the same, whereby a fibre end, respectively, is arranged to end up at a respective position on the first lateral surface, and the other end of the fibre is arranged to end up at a respective

position on the second lateral surface, whereby the fibres, respectively, permits transfer of light through the building block emitted from a light source arranged behind either of the lateral surfaces, that the cast material and the embedded fibres therein constitute a building block with a homogeneous structure that can receive load and further that a plurality of fibres are evenly distributed over substantially the whole lateral surface, respectively, whereby light can be emitted from the evenly distributed fibre ends in positions over substantially the whole lateral surface.

An advantage with this solution according to the invention is that a prefabricated light transmitting building block is provided. By means of the fibre ends that ends up at the lateral surface according to the invention it is thus possible to achieve light sources at certain spots evenly spread over substantially the whole lateral surface, which provides an feeling that the whole lateral surface is illuminated, alternatively is emitting light. Yet an advantage is that the light transmitting fibres is wholly integrated with the cast material, whereby the strength of the building block is insufficiently influenced. The building block according to the present invention presents a homogeneous structure with the capability to receive large loads.

The present invention relates also to a method for production of a building block comprising embedded light transmitting fibres in a cast material, such as optical fibres or the like, which fibres permits transfer of light from one lateral surface of the building block to an opposite lateral surface of the same, comprising the following steps; adding of a cast material in an elongated mould in a first step, arranging of a layer of fibres in the mould in a second step, which layer constitute of a

plurality of parallel arranged fibres, subjecting the mould to a mechanical pressure and/or vibration in a third step such that the layer of fibres is permitted to sink into the cast material to a desired depth, repeating first to third steps, alternatively second to third step, until the mould is filled with the cast material and a plurality of fibre layers, whereby the cast material is permitted to become solidified and form a homogeneous body, and partition of the solidified, moulded body into building blocks by cutting, such that the respective ends of the fibre layers ends up at a lateral side, respectively, of the building block.

The light transmission of the building block works both with natural and artificial light. Preferably use is made of light transmitting fibres such as glass fibres, optical fibres, fibres of transparent plastics or the similar. The fibre thickness can be in the order of from some tenth part millimetres up to a few millimetres. The luminous transmittance of the building block depends on the number of fibres, but may suitably be about 1/10, i.e. a tenth part of the light that illuminates one side of the building block is emitted by the fibres to the other side of the block.

The cast material can be of concrete, cement, gypsum, plastics, metal or the like. Suitably use is made of concrete or cement that provides an average density of the prepared building block within the range from about 2200 kg/m^3 up to about 2400 kg/m^3. The number of fibres per building block can be in the range from some hundred up to some thousand. The volume relation of the cast material and fibres is preferably within the range from about 1:15 up to about 1:8. A suitably dimension of a building block produced by the method according to the present invention

is e.g. 250mm/120mm/68mm, which has a weight of about 5 kg and a concrete/fibre relation of 1:13.

Description of the drawings

The present invention will now be described more in detail by way of examples, with reference to the accompanying drawings, without limiting the interpretation of the invention thereto, where

fig. 1 shows in a perspective view at an angle from above of a building block according to the invention,

fig. 1B shows a cross-section A-A of the building block in fig. 1A,

fig. 1C shows a longitudinal section B-B of the building block in fig. 1A,

fig. 1D shows a partially perspective view of a wall built of a number of building blocks according to fig. 1A, and

fig. 2a-C shows in a schematic drawing various steps of a production method of a building block according to the present invention.

Detailed description of embodiments

A building block 2 according to the invention is shown in figs. 1A-C. The building block comprises a cast material 4 and embedded light transmitting fibres 6 in the cast material. The fibres are arranged in the cast material from a first lateral surface 8 of the building block to an opposite second lateral surface 10. One end of a fibre 6, respectively, is arranged to end up at a position 12 at the first lateral surface 8 and the other end of the fibre is arranged to end up at a position 14 on the second lateral surface 16. Pluralities of fibres 6, suitably some hundred single fibres, are arranged in parallel in the longitudinal direction L of the building

block. The fibres are evenly spread in the block 2 and the ends of the fibres thus ends up at the lateral surfaces in positions 12, 14 over substantially the whole lateral surface 8, 10, respectively. The fibres permits that light is transferred through the building block emitted from a light source arranged e.g. behind the second lateral surface 10, to the first lateral surface 8, or vice versa, whereby light is emitted from the evenly distributed fibre ends in positions over substantially the whole lateral surface.

In that fibres are evenly distributed in the block 2 and that the cast material substantially surrounds respective fibre as evident in figs. 1A-C, the block forms a homogeneous structure with high strength. Load-bearing walls of desired size and extension could thereby easily be constructed with a number of integral building blocks 2 as is evident from fig. 1D.

In figs. 2A-C is shown a production method according to the present invention, for production of a building block 2 according to the invention as described above. In an elongated mould 20 (see fig. 2A) of e.g. steel or wood, is in a first step a cast material 4 added. In a second step is a layer 22 of fibres 6 arranged in the longitudinal direction of the mould 20. In a third step, the mould is subjected to a mechanical pressure and/or vibration such that the fibre layer is permitted to sink into the cast material to a desired depth. Then, steps one to three is repeated, alternatively steps two to three, until the mould is filled with the cast material and several fibre layers. Each layer 22 constitutes of a plurality of parallel fibres 6, for example some twenty fibres or more per layer. The thickness of the layer and the fibres may suitably be about 1 mm and the number of layers can be some twenty or more. The fibre layers 22 are

fed continuously in the mould 20 from a fibre roll 24 via a nozzle 26 that provides for an even distribution of the fibres along the whole, transverse direction T of the mould. When the cast material 4 has become solidified, the solid moulded body 28 is divided by cutting into separate building blocks 2, e.g. with the dimension 250mm/120mm/68mm. The cutting is done such that the ends of the fibre layers 22, respectively, end up at a lateral surface 8, 10, respectively, of the building block 2.

Claims

1. Building block (2) comprising embedded light transmitting fibres (6) in a cast material (4), such as optical fibres or the like, where the fibres are arranged in the cast material from a first lateral surface (8) of the building block to an opposite second lateral surface (10) of the same, whereby a fibre end, respectively, is arranged to end up at a respective position (12) on the first lateral surface (8), and the other end of the fibre is arranged to end up at a respective position (14) on the second lateral surface, whereby the fibres (6), respectively, permits transfer of light through the building block emitted from a light source arranged behind either of the lateral surfaces (8,10), **characterised in** that the cast material (4) and the embedded fibres (6) therein constitute a building block (2) with a homogeneous structure that can receive load and further that a plurality of fibres (6) are evenly distributed over substantially the whole lateral surface (8, 10), respectively, whereby light can be emitted from the evenly distributed fibre ends in positions (12,14) over substantially the whole lateral surface.

2. Building block (2) according to claim 1, **characterised in** that the volume relation of the cast material (4) and fibres (6) is preferably within the range from about 1:15 up to about 1:8.

3. Building block (2) according to claim 1 or 2, **characterised in** that the cast material is concrete, cement or gypsum.

4. Method for production of a building block (2) comprising embedded light transmitting fibres (6) in a

cast material (4), such as optical fibres or the like, which fibres permits transfer of light from one lateral surface (10) of the building block to an opposite lateral surface (8) of the same, comprising the following steps:

- adding of a cast material (4) in an elongated mould (20) in a first step,
- arranging of a layer (22) of fibres (6) in the mould (20) in a second step, which layer constitute of a plurality of parallel arranged fibres,
- subjecting the mould to a mechanical pressure and/or vibration in a third step such that the layer of fibres is permitted to sink into the cast material to a desired depth,
- repeating first to third steps, alternatively second to third step, until the mould is filled with the cast material and a plurality of fibre layers,
- whereby the cast material is permitted to become solidified and form a homogeneous body (28), and
- partition of the solidified, moulded body (28) into building blocks (2) by cutting, such that the respective ends of the fibre layers (22) ends up at a lateral side (8,10), respectively, at the building block.

5. Method according to claim 4, **characterised in** that each layer (22) constitutes of at least some twenty fibres or more.

6. Method according to claim 4 or 5, **characterised in** that the fibre layers (22) are fed continuously in the mould (20) from a fibre roll (24) via a nozzle (26) that provides for an even distribution of the fibres along the whole, transverse direction (T) of the mould.

FIG. 1A

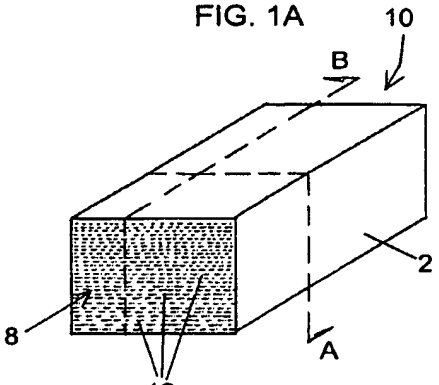

FIG. 1B

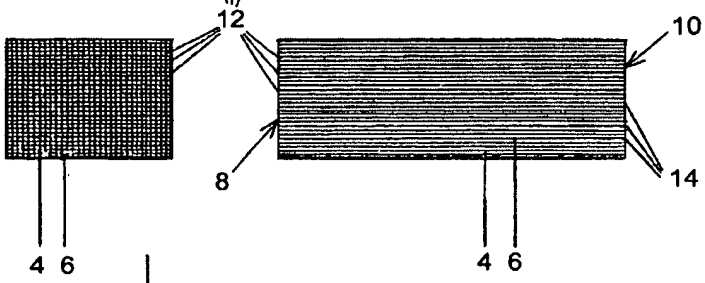

FIG. 1C

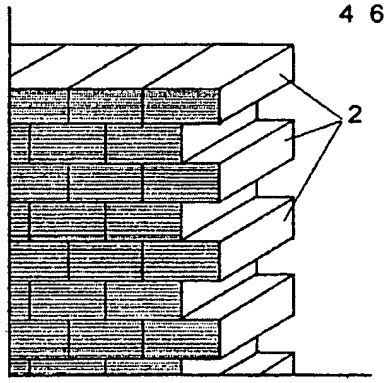

FIG. 1D

FIG. 2A

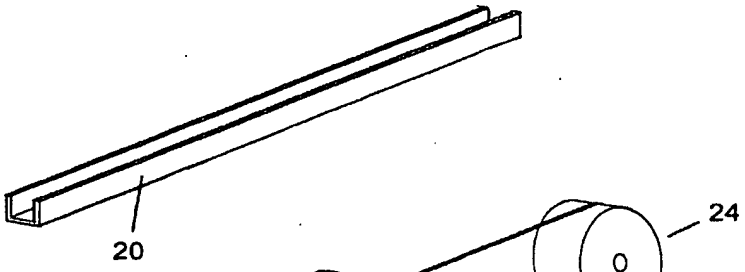

FIG. 2B

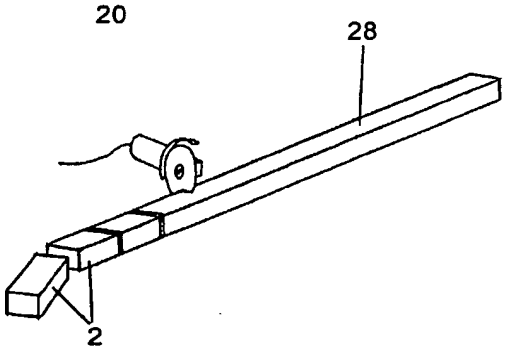

FIG. 2C

INTERNATIONAL SEARCH REPORT

International application No.
PCT/SE 03/00798

A. CLASSIFICATION OF SUBJECT MATTER

IPC7: E04B 2/02, E04C 1/42, B28B 23/00
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC7: E04B, E04C, B28B, E04D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPO-INTERNAL, WPI DATA, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	GB 1561142 A (DAVID KENNETH JOHN RICHARDSON), 13 February 1980 (13.02.80) --	1-6
A	FR 2743135 A1 (ORTH FRANCOIS), 4 July 1997 (04.07.97) --	1-6

☐ Further documents are listed in the continuation of Box C. ☒ See patent family annex.

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
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Date of the actual completion of the international search	Date of mailing of the international search report
19 June 2003	16 -07- 2003
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INTERNATIONAL SEARCH REPORT

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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
GB 1561142 A	13/02/80	NONE	
FR 2743135 A1	04/07/97	NONE	